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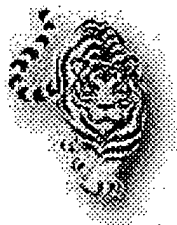
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Use to convert  
Curies to megabecquerels

# Science Time

*Last updated: 02/28/2005*



## Nuclear Reactors

**Moderator** slows down neutrons produced in chain reactions so they can be more

easily absorbed by other nuclei so fission continues.

**Control rods** absorb neutrons, controlling the rate of reaction.

**Breeder reactors** are ones in which some of the neutrons produced in the fission of

U-235 produce plutonium. This plutonium can be used in an atomic bomb.



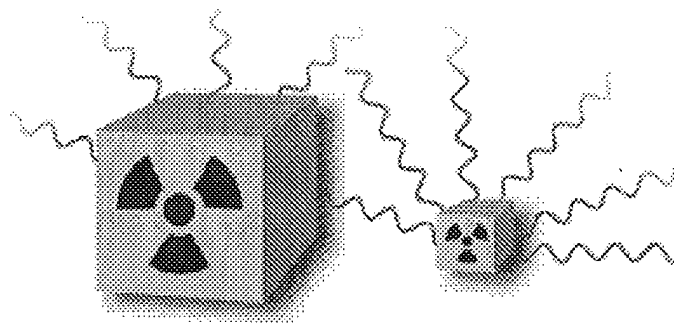
## Exposure:

The size or weight of a container or shipment does not indicate how much radioactivity is in it.

The amount of radioactivity in a quantity of material can be determined by noting how many curies of the material are present. This information should be found on labels and/or shipping papers.

More curies = a greater amount of radioactivity

A large amount of material can have a very small amount of radioactivity; a very small amount of material can have a lot of radioactivity.



For example, uranium-238 has 0.00015 curies of radioactivity per pound (0.15 millicuries), while cobalt-60 has nearly 518,000 curies per pound.

In the International System of units (SI), the becquerel (Bq) is the unit of radioactivity. One Bq is one disintegration per second (dps). One curie is 37 billion Bq. Since the Bq represents such a small amount, you are likely to see a prefix used with Bq, as shown below:

- 1 MBq (27 microcuries)
- 1 GBq (27 millicuries)
- 37 GBq (1 curie)
- 1 TBq (27 curies)

## SI Units and Prefixes

The International System of Units has been given official status and recommended for universal use.

use by the General Conference on Weights and Measures.

## Radiation Measurements

|              | Radioactivity  | Absorbed Dose | Dose Equivalent | Exposure                |
|--------------|----------------|---------------|-----------------|-------------------------|
| Common Units | curie (Ci)     | rad           | rem             | roentgen (R)            |
| SI Units     | becquerel (Bq) | gray (Gy)     | sievert (Sv)    | coulomb/kilogram (C/kg) |

prefixes and their meanings that are often used in conjunction with SI units:

| Multiple  | Prefix | Symbol |
|-----------|--------|--------|
| $10^{12}$ | tera   | T      |
| $10^9$    | giga   | G      |
| $10^6$    | mega   | M      |
| $10^3$    | kilo   | k      |
| $10^{-2}$ | centi  | c      |
| $10^{-3}$ | milli  | m      |
| $10^{-6}$ | micro  | $\mu$  |
| $10^{-9}$ | nano   | n      |

## Conversion Equivalence

1 curie =  $3.7 \times 10^{10}$   
disintegrations per second

1 becquerel =  
1 disintegration per second

1 millicurie (mCi) = 37 megabecquerels (MBq)  
1 rad = 0.01 gray (Gy)  
1 rem = 0.01 sievert (Sv)  
1 roentgen (R) = 0.000258 coulomb/kilogram (C/kg)

1 megabecquerel (MBq) = 0.027 millicuries (mCi)  
1 gray (Gy) = 100 rad  
1 sievert (Sv) = 100 rem  
1 coulomb/kilogram (C/kg) = 3,880 roentgens

### Conversion Factors

| To convert from                      | To                                   | Multiply by           |
|--------------------------------------|--------------------------------------|-----------------------|
| Curies (Ci)                          | becquerels (Bq)                      | $3.7 \times 10^{10}$  |
| millicuries (mCi)                    | megabecquerels (MBq)                 | 37                    |
| microcuries ( $\mu$ Ci)              | megabecquerels (MBq)                 | 0.037                 |
| millirads (mrad)                     | milligrays (mGy)                     | 0.01                  |
| millirems (mrem)                     | microsieverts ( $\mu$ Sv)            | 10                    |
| milliroentgens (mR)                  | microcoulombs/kilogram ( $\mu$ C/kg) | 0.258                 |
|                                      |                                      |                       |
| becquerels (Bq)                      | curies (Ci)                          | $2.7 \times 10^{-11}$ |
| megabecquerels (MBq)                 | millicuries (mCi)                    | 0.027                 |
| megabecquerels (MBq)                 | microcuries ( $\mu$ Ci)              | 27                    |
| milligrays (mGy)                     | millirads (mrad)                     | 100                   |
| microsieverts ( $\mu$ Sv)            | millirems (mrem)                     | 0.1                   |
| microcoulombs/kilogram ( $\mu$ C/kg) | milliroentgens (mR)                  | 3.88                  |